

Table 4-1: List of Soil Sample Analyses

| Soil Sample Analysis       | Analyte(s) Included   | Method            | No. of Samples |
|----------------------------|---|-------------------|----------------|
| Volatile Organic Compounds | Acetone<br>Benzene<br>Bromobenzene<br>Bromochloromethane<br>Bromodichloromethane<br>Bromoform<br>Bromomethane<br>2-Butanone<br>n-Butylbenzene<br>sec-Butylbenzene<br>tert-Butylbenzene<br>Carbon disulfide<br>Carbon tetrachloride<br>Chlorobenzene<br>Chloroethane<br>Chloroform<br>Chloromethane<br>2-Chlorotoluene<br>4-Chlorotoluene<br>Dibromochloromethane<br>1,2-Dibromo-3-chloropropane<br>1,2-Dibromoethane<br>Dibromomethane<br>1,2-Dichlorobenzene<br>1,3-Dichlorobenzene<br>1,4-Dichlorobenzene<br>Dichlorodifluoromethane<br>1,1-Dichloroethane<br>1,2-Dichloroethane<br>1,1-Dichloroethene<br>cis-1,2-Dichloroethene<br>trans-1,2-Dichloroethene<br>1,2-Dichloropropane<br>1,3-Dichloropropene<br>2,2-Dichloropropene<br>1,1-Dichloropropene<br>cis-1,3-Dichloropropene<br>trans-1,3-Dichloropropene<br>Ethylbenzene<br>Hexachlorobutadiene<br>2-Hexanone<br>Isopropylbenzene<br>p-Isopropyltoluene<br>Methylene chloride<br>4-Methyl-2-pentanone<br>Naphthalene<br>n-Propylbenzene<br>Styrene<br>1,1,1,2-Tetrachloroethane<br>1,1,2,2-Tetrachloroethane<br>Tetrachloroethene<br>Toluene<br>1,2,3-Trichlorobenzene<br>1,2,4-Trichlorobenzene<br>1,1,1-Trichloroethane<br>1,1,2-Trichloroethane<br>Trichloroethene<br>Trichlorofluoromethane<br>1,2,3-Trichloropropane<br>1,2,4-Trimethylbenzene<br>1,3,5-Trimethylbenzene<br>Vinyl chloride<br>o-Xylene<br>m,p-Xylene | USEPA Method 8260 | 12             |

| Soil Sample Analysis  | Analyte(s) Included  | Method   | No. of Samples |
|---|--|--|----------------|
| Preliminary Total PCBs (Level 3 data package) with 48-hour turnaround | Total PCBs Only  | USEPA Method 8082 for total PCBs                     | 49             |
| Total PCBs (Level 3 data package) with standard turnaround            | Total PCBs Only  | USEPA Method 8082 for total PCBs                     | 193            |
| PCBs as Aroclors and congeners (Level 4 data package)                 | Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, Aroclor 1260<br>2-Chlorobiphenyl<br>2,3-Dichlorobiphenyl<br>2,2',5'-Trichlorobiphenyl<br>2,4',5'-Trichlorobiphenyl<br>2,2',3,5'-Tetrachlorobiphenyl<br>2,2',5,5'-Tetrachlorobiphenyl<br>2,3',4,4'-Tetrachlorobiphenyl<br>2,2',3,4,5'-Pentachlorobiphenyl<br>2,2',4,5,5'-Pentachlorobiphenyl<br>2,3,3',4',6'-Pentachlorobiphenyl<br>2,2',3,4,4',5'-Hexachlorobiphenyl<br>2,2',3,4,5,5'-Hexachlorobiphenyl<br>2,2',3,5,5',6'-Hexachlorobiphenyl<br>2,2',4,4',5,5'-Hexachlorobiphenyl<br>2,2',3,3',4,4',5'-Heptachlorobiphenyl<br>2,2',3,4,4',5,5'-Heptachlorobiphenyl<br>2,2',3,4,4',5',6'-Heptachlorobiphenyl<br>2,2',3,4',5,5',6'-Heptachlorobiphenyl<br>2,2',3,3',4,4',5,5',6'-Nonachlorobiphenyl | USEPA Method 8082 for PCBs as Aroclors and Congeners | 25             |
| Semi-Volatile Petroleum Products                                      | N/A<br>Results reported as TPH concentration in ranges of hydrocarbon fractions  | Ecology NWTPH-Dx                                     | 52             |
| Volatile and Extractable Petroleum Hydrocarbons                       | N/A<br>Results reported for volatile and semi-volatile TPH concentrations in ranges of hydrocarbon fractions.<br>– normalized to the boiling point of n-alkanes, and its retention time in a GC column.  | Ecology publication 97-602                           | 12             |
| Total organic carbon  | N/A  | EPA 415.1  | 8              |

#### 4.2.3 Soil Physical Properties

During the installation of four groundwater monitoring wells, soil samples will be collected for geotechnical analysis. The results obtained from the geotechnical soil samples will provide information needed to complete vadose zone transport modeling (if needed) and for designing and evaluating possible cleanup alternatives at the City Parcel Site.

Two samples for physical (geotechnical) testing will be collected at each well location using the sampling procedures described in the SAP. The geotechnical soil samples will be analyzed for the properties listed below. The appropriate ASTM or EPA method number is also shown in parenthesis.

- Grain Size (Sieve) Analysis (ASTM D422-63)
- Cation Exchange Capacity (EPA Method 9080/1)
- Moisture Content (ASTM D2216)
- Atterburg Limits (ASTM D4318)
- Modified Proctor (ASTM D1557)
- Permeability (ASTM D2434)

Sample liners will be capped with square Teflon sheets and end caps. The in-situ orientation of the sample will be mark with an arrow on the outside of each liner. Samples for modified proctor testing and cation-exchange-capacity (CEC) will be collected from drill cuttings in a clean 5-gallon bucket (minimum 2.5 pound of sample required). Grain-size samples will be collected using a split-spoon or Dames and Moore sampler with or without liner sleeves. Samples will be transferred into a clean 1-gallon freezer style bag. Based upon existing geologic data at the site, sample intervals are anticipated near the ground surface and between 25 to 60 feet bgs. Final determination of the interval to sample will be based upon the variability of geologic material observed in the field.

#### 4.3 Groundwater Investigation

The goal of the City Parcel Site groundwater investigation will be to adequately define the downgradient extent of hazardous substances released from the facility (if any) and identify the physical boundaries of that release. Four groundwater monitoring wells will be installed to assess the potential impact of source areas on shallow groundwater quality beneath and downgradient from the site. The wells will be installed in compliance with Ch. 173-160 WAC. The proposed well locations and installation procedures are described in detail in the SAP.

SAIC will complete two quarterly sampling rounds to collect groundwater samples from the monitoring wells at the site. The first round of groundwater sampling will occur when the wells are installed and developed, and sufficiently stabilized. The second round will occur approximately three months after the first round. Refer to the SAP for a discussion of well installation, development, sampling, and quality assurance procedures.

Each monitoring well will be equipped with dedicated QED micropurge® sampling equipment to facilitate collection of groundwater samples. The downhole equipment will consist of a QED Well Wizard® bladder pump, screened inlet, and sample tubing. Equipment installation will be completed at the surface with a well cap that fits over the well riser pipe.

An Insitu Minitroll® combined pressure transducer and data logger will be installed in one well to record water level data every four hours for six months. The installation depth of all equipment will be documented on a sampling system design form to be provided in the RI Report.

#### 4.3.1 Groundwater Sample Stations

The proposed monitoring well locations are described in the SAP. The actual location of the monitoring wells are subject to change based on preliminary information gathered from the site physical study and soil investigation. An existing monitoring well (MW-1) was installed at the City Parcel Site in 1997. The existing well is located near a drywell at the southeast corner of the City Parcel building, and is somewhat upgradient in relation to the reported groundwater flow under the property. The condition of the existing well is unknown at this time.

One monitoring well (MW-2) will be installed upgradient from the City Parcel Site. The proposed location for the upgradient well is in the John Barrier Trust Property located to the east of the site. This location is sufficiently upgradient from the site, presents minimal traffic and vandalism hazards, and will provide excellent triangulation, with respect to the proposed well locations, for determining groundwater gradients at the site.

Three downgradient wells will be installed in linear fashion along the western edge of the City Parcel property. One monitoring well (MW-3) will be located just northwest of the southwest corner of the building. A second monitoring well (MW-4) will be located just north of the garage door and south of the office entry. A third monitoring well (MW-5) will be located at the far northwest corner of the property just outside the property fence.

#### 4.3.2 Groundwater Chemical Analyses

Groundwater samples will be collected and analyzed for water quality parameters and chemical contaminants. Table 4-2 contains a list of the groundwater analyses to be completed, analytes for each test, analytical methods to be used, and the estimated number of samples to be submitted.

For water quality parameters and TPH samples, three samples will be collected during each groundwater-sampling event. For PCBs, samples will be collected from each of the 5 wells during the quarterly sampling events. This assumes the existing monitoring well (MW-1) is still serviceable. Standard laboratory methods will be used for all analyses. Metals analyses shall be performed on unfiltered samples, unless the conditions of WAC 173-340-720(8) can be demonstrated. The following water quality parameters will be measured.

Table 4-2: Groundwater Sample Analyses

| Groundwater Sample Analysis                     | Analyte(s) Included   | Method   | No. of samples per quarter |
|---|---|--|----------------------------|
| PCBs (Level 4 data package)                     | Total PCBs, Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, Aroclor 1260, 2-Chlorobiphenyl, 2,3-Dichlorobiphenyl, 2,2',5'-Trichlorobiphenyl, 2,4',5'-Trichlorobiphenyl, 2,2',3,5'-Tetrachlorobiphenyl, 2,2',5,5'-Tetrachlorobiphenyl, 2,3',4,4'-Tetrachlorobiphenyl, 2,2',3,4,5'-Pentachlorobiphenyl, 2,2',4,5,5'-Pentachlorobiphenyl, 2,3,3',4',6-Pentachlorobiphenyl, 2,2',3,4,4',5'-Hexachlorobiphenyl, 2,2',3,4,5,5'-Hexachlorobiphenyl, 2,2',3,5,5',6-Hexachlorobiphenyl, 2,2',4,4',5,5'-Hexachlorobiphenyl, 2,2',3,3',4,4',5'-Heptachlorobiphenyl, 2,2',3,4,4',5,5'-Heptachlorobiphenyl, 2,2',3,4,4',5',6-Heptachlorobiphenyl, 2,2',3,4',5,5',6-Heptachlorobiphenyl, 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl | USEPA Method 8082 for total PCBs and PCBs as Aroclors and congeners  | 5                          |
| Semi-Volatile Petroleum Products                | N/A<br>Results reported as TPH concentration within various ranges of hydrocarbon fractions   | Ecology NWTPH-Dx   | 3                          |
| Volatile and Extractable Petroleum Hydrocarbons | N/A<br>Results are reported for volatile and semi-volatile TPH concentrations within ranges of hydrocarbon fractions – normalized to the boiling point of n-alkanes, and its retention time in a GC column.   | Ecology publication 97-602, VPH and EPH Methods  | 3                          |
| Total organic carbon                            | N/A   | EPA 415.1  | 3                          |
| Metals  | Calcium<br>Iron<br>Magnesium<br>Manganese<br>Potassium<br>Sodium  | SW-846 6010B<br>SW-846 6010B<br>SW-846 6010B<br>SW-846 6010B<br>SW-846 6010B<br>SW-846 6010B                                   | 3                          |
| Conventionals                                   | Alkalinity, total<br>Alkalinity, as bicarbonate<br>Chloride<br>Sulfate<br>COD<br>Ammonia<br>Nitrogen, NO <sub>3</sub> & NO <sub>2</sub><br>Solids, Total Dissolved<br>Total Organic Carbon<br>Turbidity   | EPA 310.1<br>EPA 310.1<br>EPA 300.0<br>EPA 300.0<br>EPA 410.4<br>EPA 350.3<br>EPA 353.2<br>EPA 160.1<br>EPA 415.2<br>EPA 180.1 | 3                          |

#### 4.3.3 Groundwater Physical Properties

Temporal variations in groundwater flow patterns and velocity shall be determined through installation of an electronic water level recording device(s) in one monitoring well (location to be determined during the field investigations). The water level data will be recorded at a frequency of one measurement per 4 hours for six months.

## 5. RI REPORT

SAIC will prepare a Draft and Final RI Report to present an analysis and summary of all facility investigations and their results. The objective of the report will be to ensure that the investigation data are sufficient in quality and quantity to describe the nature and extent of contamination, threats and potential threats to human health and the environment, and to support a Feasibility Study.

The Draft and Final RI reports will be submitted in hardcopy and/or PDF format, as requested by Ecology. Site map(s)/sampling locations will be submitted in Arc View format and analytical data appendices will be submitted on diskette in Microsoft Excel or Access format. The following items will be included in the RI Report.

### 5.1 Data Analysis

The RI Report will include a review of all facility investigation data collected on the type and extent of contamination at the facility. The review will include descriptions of contamination sources and migration pathways identified during the RI. Data gaps (items requiring further investigation), and recommended activities for further investigation – to fill data gaps – will also be provided in the RI.

The RI Report will contain a discussion of the sampling results to include the following items.

- Nature of the contamination
- Extent of the contamination, including the estimated volume of material needing remediation
- The pathways by which contamination reached or can reach the media
- Known or potential hazards and risks to the public health, welfare, and the environment, including physical hazards.

### 5.2 Appendices

Appendices to the RI Report will contain full documentation of investigative activities and analytical results. The appendices will identify any changes made in sample collections and/or analysis from the final SAP including opportunity samples and any other changes. Other information to be provided in the appendices will include general field observations, such as:

- Groundwater characterization
- Groundwater flow maps
- Locations of nearby wells
- Well log information
- Soil conditions
- Well driller logs and observations

**5.3 Sample location map**

A map of the City Parcel Site will be provided in the RI Report to include approximate distances, sample media, and sample numbers collected during the RI.

**5.4 Table of results**

The RI Report will contain data tables identifying geophysical results, contaminant concentrations, and field sampling/measurement results. Contaminant concentrations will be compared to MTCA Method A Residential cleanup levels with a notation when levels are exceeded.

**5.6 Quality assurance**

The Draft and Final RI Report will contain a data quality assessment report to summarize the findings of all data validation activities completed during the RI. The Data Quality Assessment will include:

- A detailed evaluation of data according to the approved QA/QC plan
- A full data package (as an appendix) including QA/QC information and field logs with date, time and activity information
- An analysis of data in relation to possible cleanup action alternatives and recommendations of cleanup action alternatives to be investigated
- Recommendations for further study, if necessary.

**5.7 Project Schedule**

| <b>Deliverable/Activity Description</b>                              | <b>Due Date</b> |
|--|-----------------|
| Submit Draft RI Work Plan and Draft SAP                              | 1/4/02          |
| Submit Draft HASP, Data Management Plan, and ISR Document            | 1/11/02         |
| Ecology Review of Draft Project Planning Documents                   | N/A             |
| Receive comments on Draft RI Work Plan and Draft SAP                 | 1/28/02         |
| Receive comments on Draft HASP and Data Management Plan              | 2/8/02          |
| Submit Final RI Work Plan and Draft SAP                              | 2/18/02         |
| Submit Final HASP and Data Management Plan                           | 2/28/02         |
|  |                 |
| Mobilization for drilling and soil sampling                          | Mar. 2002       |
| Install groundwater wells and begin soil sampling                    | Apr. 2002       |
| Complete soil sampling   | May 2002        |
| 1 <sup>st</sup> Round of quarterly GW sampling                       | Apr. 2002       |
| Receive validated sample data from 1 <sup>st</sup> round GW sampling | May 2002        |
| Receive validated soil sample data                                   | June 2002       |
| 2 <sup>nd</sup> Round of quarterly GW sampling                       | July 2002       |
| Receive validated sample data from 2 <sup>nd</sup> round GW sampling | Aug. 2002       |
| Submit Draft RI Report   | Oct. 2002       |
| Receive Ecology Comments on Draft RI Report                          | Dec. 2002       |
| Submit Final RI Report   | Jan. 2003       |